

WHAT IS CLAIMED IS:

Sub G/ 1. A process of depositing a multi layer coating on at least a portion of an article surface comprising:

depositing by electroplating at least one electroplated layer on at least a portion of said article to form an electroplated article;

subjecting said article having said at least one electroplated layer to pulse blow drying to dry said article and remove any liquid spots therefrom; and

depositing by physical vapor deposition at least one layer on at least a portion of said electroplated layer.

2. The process of claim 1 wherein said electroplating comprises electroplating at least one layer selected from copper, nickel and chrome on at least a portion of said article surface.

3. The process of claim 2 wherein at least one layer selected from refractory metal, refractory metal alloy, refractory metal compound, and refractory metal alloy compound is vapor deposited on at least a portion of said at least one electroplated layer.

A 4. The process of claim 3 wherein said refractory metal and refractory metal alloy is selected from zirconium, titanium and zirconium-titanium alloy.

Sub B3 5. The process of claim 4 wherein said refractory metal and refractory metal alloy is selected from zirconium and zirconium-titanium alloy.

6. The process of claim 3 wherein said refractory metal compound and refractory metal alloy compound is selected from nitrides,

carbides, carbonitrides, oxides and reaction products of refractory metal or refractory metal alloy, oxygen and nitrogen.

A 7. The process of claim 5 wherein said refractory metal compound and refractory metal alloy compound is selected from nitrides, oxides and reaction products of refractory metal or refractory metal alloy, oxygen and nitrogen.

Sup B4 8. The process of claim 7 wherein said refractory metal compound and refractory metal alloy compound is selected from zirconium nitride, zirconium oxide, reaction products of zirconium, oxygen and nitrogen, titanium nitride, titanium oxide, reaction products of titanium, oxygen and nitrogen, zirconium-titanium alloy nitride, zirconium-titanium alloy oxide, and reaction products of zirconium-titanium alloy, oxygen and nitrogen.

9. The process of claim 8 wherein said refractory metal compound and refractory metal alloy compound is selected from zirconium oxide, zirconium nitride, reaction products of zirconium, oxygen and nitrogen, zirconium-titanium alloy nitride, zirconium-titanium alloy oxide, and reaction products of zirconium-titanium alloy, oxygen and nitrogen.

Sub F1 10. The process of claim 7 wherein said electroplating comprises electroplating at least one layer comprised of copper on at least a portion of the surface of said article to provide at least one electroplated copper layer, electroplating at least layer comprised of nickel on said at least one electroplated copper layer to provide at least one electroplated nickel layer, and electroplating at least one layer comprised of chrome in said at least one electroplated nickel layer to provide at least one electroplated chrome layer.

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11. The process of claim 10 wherein at least one layer selected from refractory metal and refractory metal alloy is vapor deposited on at least a portion of said electroplated chrome layer.

12. The process of claim 11 wherein said refractory metal and refractory metal alloy is selected from zirconium, titanium and zirconium-titanium alloy.

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13. The process of claim 12 wherein said refractory metal and refractory metal alloy is selected from zirconium and zirconium-titanium alloy.

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14. The process of claim 13 wherein a sandwich coating comprised of alternating layers of zirconium or zirconium-titanium alloy and zirconium nitride or zirconium-titanium alloy nitride is vapor deposited over said zirconium or zirconium-titanium alloy layer.

15. The process of claim 14 wherein a zirconium nitride or zirconium-titanium alloy nitride layer is vapor deposited over said sandwich layer.

16. The process of claim 15 wherein a zirconium oxide or zirconium-titanium oxide layer is vapor deposited over said zirconium nitride or zirconium-titanium alloy nitride layer.

17. The process of claim 15 wherein a layer comprised of the reaction products of zirconium or zirconium-titanium alloy, oxygen and nitrogen is vapor deposited over said zirconium nitride or zirconium-titanium alloy nitride layer.

18. The process of claim 13 wherein a layer comprised of zirconium nitride or zirconium-titanium alloy nitride is vapor deposited over said zirconium or zirconium-titanium alloy layer.

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19. The process of claim 18 wherein a layer comprised of zirconium oxide or zirconium-titanium alloy oxide is vapor deposited over said zirconium nitride or zirconium-titanium nitride alloy layer.

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20. The process of claim 18 wherein a layer comprised of the reaction products of zirconium or zirconium-titanium alloy layer, oxygen and nitrogen is vapor deposited over said zirconium nitride or zirconium-titanium alloy nitride layer.

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21. The process of claim 1 wherein said electroplating comprises electroplating at least one layer selected from nickel and chrome on at least a portion of said article surface.

22. The process of claim 21 wherein at least one layer selected from refractory metal, refractory metal alloy, refractory metal compound, and refractory metal alloy compound is vapor deposited on at least a portion of said at least one electroplated layer.

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23. The process of claim 22 wherein said refractory metal and refractory metal alloy is selected from zirconium, titanium and zirconium-titanium alloy.

24. The process of claim 23 wherein said refractory metal and refractory metal alloy is selected from zirconium and zirconium-titanium alloy.

25. The process of claim 22 wherein said refractory metal compound and refractory metal alloy compound is selected from nitrides,

carbides, carbonitrides, oxides and reaction products of refractory metal or refractory metal alloy, oxygen and nitrogen.

26. The process of claim 25 wherein said refractory metal compound and refractory metal alloy compound is selected from nitrides, oxides and reaction products of refractory metal or refractory metal alloy, oxygen and nitrogen.

27. The process of claim 26 wherein said refractory metal compound and refractory metal alloy compound is selected from zirconium nitride, zirconium oxide, reaction products of zirconium, oxygen and nitrogen, titanium nitride, titanium oxide, reaction products of titanium, oxygen and nitrogen, zirconium-titanium alloy nitride, zirconium-titanium alloy oxide, and reaction products of zirconium-titanium alloy, oxygen and nitrogen.

28. The process of claim 27 wherein said refractory metal compound and refractory metal alloy compound is selected from zirconium oxide, zirconium nitride, reaction products of zirconium, oxygen and nitrogen, zirconium-titanium alloy nitride, zirconium-titanium alloy oxide, and reaction products of zirconium-titanium alloy, oxygen and nitrogen.

29. The process of claim 25 wherein said electroplating comprises electroplating at least one layer comprised of nickel on at least a portion of the surface of said article to provide at least one electroplated nickel layer, and electroplating at least one layer comprised of chrome on said at least one electroplated nickel layer to provide at least one electroplated chrome layer.

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30. The process of claim 29 wherein at least one layer selected from refractory metal and refractory metal alloy is vapor deposited on at least a portion of said electroplated chrome layer.

31. The process of claim 30 wherein said refractory metal and refractory metal alloy is selected from zirconium, titanium and zirconium-titanium alloy.

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32. The process of claim 31 wherein said refractory metal and refractory metal alloy is selected from zirconium and zirconium-titanium alloy.

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33. The process of claim 32 wherein a sandwich coating comprised of alternating layers of zirconium or zirconium-titanium alloy and zirconium nitride or zirconium-titanium alloy nitride is vapor deposited over said zirconium or zirconium-titanium alloy layer.

34. The process of claim 33 wherein a zirconium nitride or zirconium-titanium alloy nitride layer is vapor deposited over said sandwich layer.

35. The process of claim 34 wherein a zirconium oxide or zirconium-titanium oxide layer is vapor deposited over said zirconium nitride or zirconium-titanium alloy nitride layer.

36. The process of claim 34 wherein a layer comprised of the reaction products of zirconium or zirconium-titanium alloy, oxygen and nitrogen is vapor deposited over said zirconium nitride or zirconium-titanium alloy nitride layer.

37. The process of claim 32 wherein a layer comprised of zirconium nitride or zirconium-titanium alloy nitride is vapor deposited over said zirconium or zirconium-titanium alloy layer.

38. The process of claim 37 wherein a layer comprised of zirconium oxide or zirconium-titanium alloy oxide is vapor deposited over said zirconium nitride or zirconium-titanium nitride alloy layer.

39. The process of claim 37 wherein a layer comprised of the reaction products of zirconium or zirconium-titanium alloy layer, oxygen and nitrogen is vapor deposited over said zirconium nitride or zirconium-titanium alloy nitride layer.

40. The process of claim 1 wherein at least one layer selected from refractory metal, refractory metal alloy, refractory metal compound, and refractory metal alloy compound is vapor deposited on at least a portion of said at least one electroplated layer.

41. The process of claim 38 wherein said refractory metal and refractory metal alloy is selected from zirconium, titanium and zirconium-titanium alloy.

42. The process of claim 39 wherein said refractory metal and refractory metal alloy is selected from zirconium and zirconium-titanium alloy.

43. The process of claim 38 wherein said refractory metal compound and refractory metal alloy compound is selected from nitrides, carbides, carbonitrides, oxides and reaction products of refractory metal or refractory metal alloy, oxygen and nitrogen.

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42. The process of claim 41 wherein said refractory metal compound and refractory metal alloy compound is selected from nitride, oxides and reaction products of refractory metal or refractory metal alloy, oxygen and nitrogen.

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43. The process of claim 42 wherein said refractory metal compound and refractory metal alloy compound is selected from zirconium nitride, zirconium oxide, reaction products of zirconium, oxygen and nitrogen, titanium nitride, titanium oxide, reaction products of titanium, oxygen and nitrogen, zirconium-titanium alloy nitride, zirconium-titanium alloy oxide, and reaction products of zirconium-titanium alloy, oxygen and nitrogen.

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44. The process of claim 43 wherein said refractory metal compound and refractory metal alloy compound is selected from zirconium oxide, zirconium nitride, reaction products of zirconium, oxygen and nitrogen, zirconium-titanium alloy nitride, zirconium-titanium alloy oxide, and reaction products of zirconium-titanium alloy, oxygen and nitrogen.

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45. The process of claim 1 wherein at least one layer selected from refractory metal and refractory metal alloy is vapor deposited on at least a portion of said electroplated article.

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46. The process of claim 45 wherein said refractory metal and refractory metal alloy is selected from zirconium, titanium and zirconium-titanium alloy.

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47. The process of claim 46 wherein said refractory metal and refractory metal alloy is selected from zirconium and zirconium-titanium alloy.



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48. The process of claim 47 wherein a sandwich coating comprised of alternating layers of zirconium or zirconium-titanium alloy and zirconium nitride or zirconium-titanium alloy nitride is vapor deposited over said zirconium or zirconium-titanium alloy layer.

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49. The process of claim 48 wherein a zirconium nitride or zirconium-titanium alloy nitride layer is vapor deposited over said sandwich layer.

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50. The process of claim 49 wherein a zirconium oxide or zirconium-titanium oxide layer is vapor deposited over said zirconium nitride or zirconium-titanium alloy nitride layer.

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51. The process of claim 49 wherein a layer comprised of the reaction products of zirconium or zirconium-titanium alloy, oxygen and nitrogen is vapor deposited over said zirconium nitride or zirconium-titanium alloy nitride layer.

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52. The process of claim 47 wherein a layer comprised of zirconium nitride or zirconium-titanium alloy nitride is vapor deposited over said zirconium or zirconium-titanium alloy layer.

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53. The process of claim 52 wherein a layer comprised of zirconium oxide or zirconium-titanium alloy oxide is vapor deposited over said zirconium nitride or zirconium-titanium nitride alloy layer.

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54. The process of claim 52 wherein a layer comprised of the reaction products of zirconium or zirconium-titanium alloy layer, oxygen and nitrogen is vapor deposited over said zirconium nitride or zirconium-titanium alloy nitride layer.

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55. The process of claim 1 wherein said article is comprised of metal or a metal alloy.

58. The process of claim 55 wherein said article is comprised of brass.

59. The process of claim 55 wherein said article is comprised of zinc.

60. The process of claim 1 wherein said article is comprised of plastic.

61. The process of claim 1 wherein said article is a faucet.

62. The process of claim 1 wherein said article is door lock hardware.

63. The process of claim 1 wherein said article is a lamp.